

PATENT COOPERATION TREATY


PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 04 NOV 2005

Applicant's or agent's file reference PA135648/PCT		FOR FURTHER ACTION		See Form WIPO PCT/PEA/416	PCT
International application No. PCT/IB2004/002391		International filing date (day/month/year) 26.07.2004		Priority date (day/month/year) 30.07.2003	
International Patent Classification (IPC) or national classification and IPC C30B33/00, C30B33/06, H01L21/56, H01L21/20					
Applicant ELEMENT SIX LIMITED et al.					
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet. ✓</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 1 sheets, as follows: ✓</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (Indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>					
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>					
Date of submission of the demand 11.02.2005			Date of completion of this report 03.11.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465			Authorized Officer Edmeades, M Telephone No. +49 89 2399-2731		

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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-21 as originally filed

Claims, Numbers

7-51 as originally filed

1-6 received on 13.07.2005 with letter of 29.06.2005

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☒ the claims, Nos. 1
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	19,43
	No: Claims	1-18,20-42,44-51
Inventive step (IS)	Yes: Claims	
	No: Claims	1-51
Industrial applicability (IA)	Yes: Claims	1-51
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

SECTION I

1. Claim 1 now specifies that there exists "**sufficient spacing**" between the plates "**such that**" an error ... affects only one plate.

This feature implies a causal link between the amount of space between the plates and errors affecting neighbouring plates. Such a link was not part of the original disclosure, however. The passage at page 9, l.32-34 of the specification on which this feature is based states merely that using a set of non-contacting plates has this desired effect - without giving any information regarding the magnitude of the spacing.

SECTION V

1. Reference is made to the following documents:

D1: EP-A-589464
D2: US-A-5420443
D3: US-A-5907768
D4: WO-A-03005443
D5: JP-A-8208387

2. D1 discloses (see whole document, for example Fig.12) a device and method comprising all of the features of claim 1 (single crystal diamond plates 60; support layer 61 or 63) as well as the additional features of claims 2,4-18,20-27,31-34,38-41,44-48.

It is noted that the adjacent plates in D1 are non-contacting - see page 7, l.29-31 and page 11, l.35-37 and Fig.5.

3. D2 discloses (see Figs.1,2 and corresponding text) a device and method comprising all of the features of claim 1 (single crystal diamond plates 22; support layer 21,23) as well as the additional features of claims 2,4-15,17,20-27,31-34,38-41,44-48.

The object of D2 is to avoid using a diamond substrate. The plates 22 may be single crystal diamond (see Col.5, lines 56-68 and Fig.5).

4. D3 discloses (see Fig.4) a device and method comprising all of the features of claim 1 (single crystal diamond plates 110; support layer 102) as well as the additional features of claims 2,4-6,9,17,18,20,31,32,33,34,38-41,44-46.

It is considered implicit in view of the opening passage at Col.1, I.10 - Col.2, I.16 (problem to be solved) that the diamond plates in D3 are preferably single crystal, even if this information is not explicitly disclosed in this document.

5. D4 (see Fig.10 and corresponding text) discloses a device and method comprising all of the features of claim 1 (single crystal diamond plates A1-An); support layer B) as well as the additional features of claims 2,4-8,16,17,20-27,31-34,38,41,44,45,47,48.

In view of the passage at page 1, the skilled person would consider it implicit that the structure described in Fig.10 may also comprise single-crystal diamond.

6. D5 discloses a device comprising all of the features of claims 49-51. Moreover it is considered to lie within the usual competence of the skilled person to extend the teaching of D5 (with or without a combination with the other cited documents) to include a plurality of single-crystal plates, so that the subject-matter of claims 19,43 lacks an inventive step.

SECTION VIII

1. The presence of a plurality of independent claims in the same category means that the claims as a whole are not concise. In the present case a single independent claim in any category is appropriate.
2. The claims are unclear:

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- The feature discussed in section I would, if considered admissible, also introduce a lack of clarity. This is because whether an error in a given plate affects other tiles would be dependent on the kind of processing to be carried out on the assembly. However, this information is not, and cannot, be included within the device claim.
- Method claim 33 contains the unclear feature "processing **as required** ... respective single crystal diamond substrates". From this feature it remains unclear which, or even if any, processing steps are carried out.
In Section V, it has been interpreted in the broadest sense to mean that some additional processing steps are carried out. Moreover, the examiner notes that the claim does not require that the diamond substrates are separated as part of the further processing.
- The expression "defined tolerance of ... conceptual plane" in claim 9 is unclear as neither the tolerance nor the plane are defined in a clear manner.
- In claims 20,24 the term "the wafer" is used, though this is the first reference to a wafer. Moreover the arrangement of the plates is unclear.

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CLAIMS:

1. A diamond wafer assembly for use in a method of processing single crystal diamond substrates, comprising a plurality of single crystal diamond plates fixed to a support layer in a substantially planar arrangement such that at least one of the major surfaces of the respective fixed single crystal diamond plates defines a fabrication surface that is exposed for further processing, there existing sufficient spacing between each diamond plate such that an error with one plate position, shape or orientation affects only that plate.
2. A diamond wafer assembly according to claim 1, wherein only one of the major surfaces of the respective fixed single crystal diamond plates is exposed for further processing, the support layer forming a backing layer for the fixed single crystal diamond plates opposite the respective fabrication surfaces.
3. A diamond wafer assembly according to claim 1, wherein both of the major surfaces of the respective fixed single crystal diamond plates are exposed for further processing, the support layer extending between the respective single crystal diamond plates.
4. A diamond wafer assembly according to any one of the preceding claims, wherein the single crystal diamond plates are CVD diamond plates.
5. A diamond wafer assembly according to any one of the preceding claims, wherein the single crystal diamond plates are arranged in a predetermined array.
6. A diamond wafer assembly according to claim 1, wherein the predetermined array is regular and based on a two dimensional array of lattice points with one or more plates associated with each lattice point.